Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

INDEX.

ALGEBRA (See Solutions and Problems).
ARITHMETIC (See Solutions and Problems).
BIOGRAPHIES (With Portraits)—
Bolyai, Wolfgang [Bolyai Farkas], by Dr. George Bruce Halsted..... 1–5
Lemoine, Emile-Michel-Hyacinthe, by David Eugene Smith, Ph. D..... 29–33
Lyle, John Newton, by F. P. Matz, Ph. D..... 95–100
Miller, W. J. C., by B. F. Finkel, A. M..... 159–163
BOOKS, Reviewed, 26-28, 62-63, 93, 125-126, 157-158, 227-228, 260-262, 292-294 332-334.
Elementary Mensuration, by F. H. Stevens, 26; *Problems in Differential Calculus Supplementary to a Treatise on Differential Calculus*, by W. E. Byerly, 26; *Computation Rules and Logarithms with Tables for other Useful Functions*, by S. W. Holman, 26; *Algebra for Schools and Colleges*, by William Freeland, 26; *A Primer of the History of Mathematics*, by W. W. Rouse Ball, 27; *The Elements of Physics. A College Text Book*, by Edward L. Nichols and William S. Franklin, 27; *Elements of the Theory of Functions of a Complex Variable*, by Dr. H. Durège. Translation by George Egbert Fisher and Isaac J. Schwatt, 28; *The Number Concept*, by Levi Leonard Conant, 28; *Elements of the Differential and Integral Calculus*, by J. W. Nicholson, 62; *The Science Absolute of Space*, by John Bolyai. Translated by Dr. George Bruce Halsted, 62; *Concrete Geometry for Beginners*, by A. R. Hornbrook, 63; *Trigonometry for Schools and Colleges*, by Frederick Anderegg and Edward Drake Roe, 93; *An Elementary Treatise on Rigid Dynamics*, by W. J. Loudon, 93; *Notations de Logique Mathematique*, par G. Peano, 93; *Syllabus of Geometry*, by G. A. Wentworth, 125; *Rational Mathematics*, by Charles De Medici, 125; *Elementary Treatise on Electricity and Magnetism*, by G. C. Foster and E. Atkinson, 125; *Elementary Algebra*, by J. A. Gillett, 126; Warren Colburn's *First Lessons*, 157; H. N. Wheeler's *Second Lessons*, 157; *Logarithmic Tables*, by George William Jones, 157; *Mathematical Papers* Read at the International Mathematical Congress at Chicago. Edited by E. Hastings Moore, Oskar Bolza, Heinrich Maschke and Henry S. White, 158; *Elements of Plane and Spherical Trigonometry*, by Edwin S. Crawley, 227; *Higher Mathematics*. Edited by Mansfield Merriman and Robert S. Woodward, 227; *Elementary Algebra*, by H. S. Hall and S. R. Knight, revised by F. L. Sevenoak, 228; *Euclidean Geometry*, by J. A. Gillett, 228; *Elementary Solid Geometry and Mensuration*, by Henry Dallas Thompson, 260; *The Elements of Algebra*, by Lyman Hall, 261; *Trigonometry for Beginners*, by Rev. J. B. Lock, revised by John A. Miller, 261; *A School Algebra*, by Emerson E. White, 261; *Elements of Geometry*, by Andrew W. Phillips and Irving Fisher, 261; *A History of Elementary Mathematics*, by Florian Cajori, 262; *The Elements of Plane Geometry*, by Charles A. Hobbs, 292; *Number and Its Algebra*, by Arthur Lefevre, 293; *A Primer of the Calculus*, by E. Sherman Gould, 293; *Elements of the Differential Calculus*, by Edgar W. Bass, 293; *List of Transitive Substitution Groups of Degree Twelve*, by G. A. Miller, 293; *The Criterion for Two-Term Prismoidal Formulas*, by Dr. George Bruce Halsted, 293; *Projective Groups of Perspective Collineations in the Plane Treated Synthetically*, by Arnold Emch, 294; *Elements of Mechanics*, by Thomas W. Wright, 332; *The Elements of Physics*, Vol. II, by Edw. L. Nichols and Wm. S. Franklin, 332; *Elements of Plane and Spherical Trigonometry*, by C. W. Crockett, 332; *Darwinism and Non-Euclidean Geometry*, by Dr. George Bruce Halsted, 332; *Prismoid-*

al Formulae, by Thomas U. Taylor, 333; *Mathematical Questions and Solutions*, Edited by W. J. C. Miller, 333; *Elementary Hydro-Statics*, by William Briggs and G. H. Bryan, 333; *Inductive Manual of Straight Line and Circle*, by William J. Meyers, 333.

DIOPHANTINE ANALYSIS (See Solutions and Problems).

EDITORIALS, 23, 61-62, 123-125, 195, 227, 260, 292, 331.

ERRATA, 21, 22, 54, 60, 82-83, 89, 90, 117, 143, 148, 157, 158, 224, 262, 294, 334.

GEOMETRY (See Solutions and Problems).

INFORMATION (See Queries).

MATHEMATICAL PAPERS—

Ackermann, Emma C. and E. H. Moore, On an Interesting System of Quadratic Equations 38–41
Bandy, J. M., Development of $\sin\theta$ and $\cos\theta$ 270–273
Becher, Franklin A., Mathematical Infinity and the Differential 229–232
Bryant, I. H., Simultaneous Quadratic Equations 137–138 174–175
Calderhead, James A. and Benj. F. Yanney, New and Old Proofs of the Pythagorean Theorem 65–67, 110–113, 169–171 299–300
Collins, Joseph V., The Duplication of the Notation for Irrationals 5–7
Doolittle, Eric, Where Mathematicians are Needed 33–35
Drummond, Josiah H., On the Doctrine of Parallels 237
Ellwood, J. K., Number and Fractions 263–265
The Bond Problem 14–16
Emch, Arnold, A Special Complex of the Second Degree and Its Relation with the Pencils of Circles 127–132
Finkel, B. F., A Geometrical Proof that $0\times\infty$ is Indeterminate 207–208
Halsted, George Bruce, Non-Euclidean Geometry: Historical and Expository 13–14, 35–36, 67–69, 109 132–133
Number, Counting, Measurement 297–298
Heal, William E., Quadrature of the Circle 41–45
Heaton, Henry, A Method of Solving Quadratic Equations 236–237
Hume, Alfred, A Proposition in Determinants 235–236
Lyle, John N., Is there more than One Illimitable Space? 92
The Angle-Sum According to Playfair 77–79
Two Perpendiculars to a Transversal 269–270
Miller, G. A., Applications of Substitution Groups 197–202
Introduction to Substitution Groups 7–13, 36–38, 69–73, 104–108, 133–136 171–174
Lie's Views on Several Important Points in Modern Mathematics 295–296
Moore, Eliakim Hastings, and Emma C. Ackermann, On an Interesting System of Quadratic Equations 38–41
Philbrick, P. H., Some Trigonometric Relations Proved Geometrically 265–268
Smith, William Benjamin, The Exponental Development for Real Exponents. 163–168
Yanney, Benj. F. and J. A. Calderhead, New and Old Proofs of the Pythagorean Theorem 65–67, 110–113, 169–171 299–300
Zerr, G. B. M., A Problem in Astronomy 232–235
The Binomial Theorem 203–206
The Centroid of Areas and Volumes 46–49, 73–76 100–103

MECHANICS (See Solutions and Problems).

MISCELLANEOUS (See Solutions and Problems).

NOTES, 24-25, 60, 158, 291-292.

Prof. G. H. Harvill located at Athens, Texas, 23; Letters commending MONTHLY from John McDowell, Prof. P. S. Berg, Dr. G. A. Miller, and Dr. G. B. M.

Zerr, 23; Dr. Macfarlane's Article on "Quaternions" in *Science*, and his chapter on "Vector Analysis and Quaternions" in *Higher Mathematics for Engineering Colleges*, 23; Drs. Fisher and Schwatt's Translation of Durège's *Elements of the Theory of Functions*, 24; Death of Alexander Macmillan, 24; The Lobachevski Prize, 24-25; The University of Chicago: Summer, 1896, 25; Corrections by Drs. D. E. Smith, and E. A. Bowser, 60; Dr. Martin's Note on the Solutions of problem 45, pages 274-275, 60; Letters of Appreciation respecting MONTHLY from Charles De Medici, Adelia R. Hornbrook, Prof. George W. Howe, Prof. Cooper D. Schmitt, and Prof. E. P. Thompson, 61; Personals as to Prof. C. A. Waldo, and Prof. J. A. Calderheed, 123; Dr. Halsted's Article on the "*Essence of Number*," in *Science*, 123; Personals as to Dr. E. H. Moore, and Prof. J. J. Sylvester, 124; Encouraging Words from Mr. W. J. C. Miller, and M. A. Gruber, 124; Dr. Byerly's *Fourier's Series* and *Spherical Harmonics*, 124; Philadelphia Summer Meeting of the Mathematical Section of the University of Pennsylvania, 124; Death of T. P. Stowell, 124-125; The first volume of Dr. W. B. Smith's *Infinitesimal Analysis* in press, 158; Drs. Halsted and Smith in Europe, 158; Prof. H. C. Whitaker receives the Degree of Doctor of Philosophy, 195; Announcement of Translation in preparation of Klein's *Vortraege ueber ausgewaehlte Fragen der Elementargeometrie*, by Profs. W. W. Beman and D. E. Smith, 227; Death of Prof. H. A. Newton, of Yale, 227; Death of Prof. William J. Whitney, of Drury College, 227; Resignation of Prof. J. N. Lyle, 260; Copy of Salmon's *Higher Plane Curves* wanted, 260; Complete Sets of Volumes I and II, 260; Prof. Robt. J. Aley receives Mathematical Fellowship at University of Pennsylvania, 260; Letter of appreciation from Prof. A. B. Nelson, of Centre College, 260; Note on Article in August-September Number, by Warren Holden, 291; Note on Elimination, by J. C. Corbin, 291; The Chicago Conference of the American Mathematical Society, at University of Chicago on December 31, 1896, 292.

PORTRAITS (See Biographies).

PROBLEMS (See Solutions and Problems).

PERIODICALS, 27, 63, 94, 126, 195, 262, 294, 334.

QUERIES AND INFORMATION—

An Expression for π, by B. F. Yanney 90

Error in Dr. D. E. Smith's Translation of Prof. Klein's Paper in December Number, Vol. II. Correction by Prof. W. W. Beman 60

Error in Williamson's Calculus. Notes from Profs. Black, Bowser, and Williamson 60 157

Factorial Zero, by W. E. Heal 92

Greenwood's Note. Comments on, by Profs. B. F. Yanney, H. C. Whitaker, and W. E. Heal 90 92

Note on Article in August-September Number, by Warren Holden 291

Note on Elimination, by J. C. Corbin 291

Note on Problem 4, Miscellaneous, by C. W. M. Black 91

Note on Solution of Problem 45, page 274, by Dr. Martin 60

Note on Solution IV, page 190, by George Lilley 90

Playfair's Pseudo-Proof of the Angle-Sum, by George Bruce Halsted 122–123

Problem by Euler, by Hillsboro Mathematical Club 90–91

Proof Required of Impossibility of Expressing Roots of Cubic Equations by a Geometrical Construction, by W. E. Heal 92

Query, by John Bridges 123

Query, by George Bruce Halsted 91

Space. Is there more than One Illimitable Space ? by J. N. Lyle 92

The Origin of π, by B. F. Yanney 89
Theory and Practice Combined, by Warren Holden 123
Wanted.—List of Curves of 4th Degree that have received Particular Names, by Cooper D. Schmitt 157

SOLUTIONS AND PROBLEMS.

ARITHMETIC.

Adding 10% water to pure wine and selling the mixture at price 10% greater than the cost of the pure wine. No. 66 301
A agrees to work a year for $300 and a suit of clothes. No. 67 301
Brokerage for buying bank bills, some of which are worthless, and disposing of remainder at par, to find face amount. No. 59 175
Digging ditch, to find length dug in problem in proportion. No. 64 ..... 274, 301
Groups; Methodists, Democrats, Farmers. No. 69 302
Hiring carriage and taking in passengers on the way, to find how much each shall pay. No. 58 139
Insurance, to find value of store, insured under given conditions, and which was burned down. No. 61 209
Milk dealer's rate of profit in buying and selling milk at stated prices given, to find how much water in milk sold. No. 62 238
Million, how long to count in manner given. No. 55 50
Partial payments on note with annual interest. No. 53 50
Pasturage problem, solved without aid of algebra. No. 57 ..... 114, 139
Payment, when will discharge debt parts of which fall due at different times. No. 63 ..... 238, 273
Pipe of given length, diameter, orifice, and weight, to find diameter of pipe of same length and orifice, but of different weight. No. 60 208
Population of a city annually increasing $2\frac{1}{2}\%$. No. 64 302
Profit made in buying and selling broadcloth at commercial discounts, and receiving time note in payment, which is discounted at bank. No. 65 275
Traveling, to find when A, B, and C will meet under conditions of problem. No. 56 113

ALGEBRA.

Algebraic equation, prove that every equation can be transformed into another of same degree but wanting n^{th} term. No. 62 210
Bond Problem. No. 56 115–116
Chickens, how many raised in 20 years, and how many in 20th year. No. 64 244–248
Determinants, to find quotient in problem by. No. 57 116
Equations, solved. No. 66 303–305
Identity in a problem demonstrated. No. 61 177–178
Land problem, find how much each of three parties bought, and price received by each per acre at sale. No. 65 248–250
Product of n n^{th} roots of 1 is $+1$ or -1 according as n is odd or even. Generalize for the n n^{th} roots of m. No. 59 142
Product, transform $x^4+y^4+z^4-2y^2z^2-2z^2x^2-2x^2y^2$ into a. No. 54 51–52
Prove that $\cos n\pi/7+\cos 3n\pi/7+\cos 5n\pi/7=\frac{1}{2}$ or $-\frac{1}{2}$, according as n is odd or even. No. 67 305–307
Quadratics, equations solved by. No. 63 211–213
Series, sum to n terms and find n^{th} term. No. 58 141
Telegraph poles, how many minutes to count poles that number counted may equal miles per hour train runs. No. 60 177

Triangles, two right triangles so placed as to have common base, knowing hypotenuses and perpendicular distance from intersection of hypotenuse to base, to find base. General case discussed. No. 55 52–54

GEOMETRY.

Ellipse, to find length of diameter, when major and minor axes, and angle which diameter forms with major axis is given. No. 55 180
Ellipses, loci of foci of variable, passing through the foci of a given ellipse and having the tangents at ends of major axes for directrices, form a pair of circles passing through extremities of major axis of fixed ellipse and having for diameters the semi-latas rectum of fixed ellipse. No. 60 276
Hyperbola—a rectangular, cannot be cut from right circular cone, if the angle at its vertex is less than a right angle. No. 63 309–310
Imaginary points, an independent number of conjugate pairs of such points on a real line. No. 57 214
Parallelopiped—rectangular, length of rectangular parallelopiped inscribed in. No. 41 55
Pole problem, find length of white part of painted, standing on hill-side, with given data. No. 53 144
Nine-points circle, locus of centers of isogonal transformations of all diameters of circumcircle of any triangle is the. No. 56 213
Note on the solutions of problem 45 60
Rolling ellipse, surface on which rolls determined, when its center moves in a horizontal line. No. 52 144
Schwatt's problems involving proofs in the geometry of the triangle. Nos. 48, 54, and 58 ..... 17, 179, 239
Tangent plane of any point of surface $a^2 x^2 + b^2 y^2 + c^2 z^2 = 2bcyz + 2acxz + 2abxy$ intersects the surface $ayz + bzx + cxy = 0$ in two straight lines at right angles to one another. No. 59 241
Trapezoid, having given base, altitude, and angle formed by intersection of diagonals, to construct. No. 51 118
Triangle, isosceles is maximum of all, inscribed in segment of circle, with chord as base. No. 49 56
Triangle, to divide into ratio of m to n by line perpendicular to base. No. 50 .. 118
Triangles, find value of perpendiculars from point of intersection of bisectors of angles A, B, C of triangle on sides of triangle $A'B'C'$, in terms of radii of inscribed and circumscribed circles of ABC and distances of center of circumscribed circle from center of escribed circle. No. 61 277
Triangles, two triangles are equal if they have two sides and the median of one of them equal, each to each. No. 62 277
Triangle, bisectors of angles A, B, C, meet sides in A', B', C'. No. 64 310–312

CALCULUS.

Cube revolved on diagonal, define figure described and calculate its volume. No. 36 20
Definite integrals, error in example in *Williamson's Integral Calculus* corrected. No. 43 ..... 21, 60, 157
Differential equation $dy \div dx = y(x-y) \div x(x+y)$ solved. No. 53 313
Draw bridge, path of man crossing a, while opening, and ratio of rate in his path and velocity of end of bridge, required. No. 50 250
Ellipsoid, find maximum, cut out of given right conic frustum. No. 51 250
Leaf of strophoid, in leaf of, find axis of inscribed leaf of lemniscate, and in leaf of lemniscate find axis of inscribed leaf of strophoid. No. 49 182

Path of fly passing over diameter of revolving table, and ratio of rates of table and fly, determined. No. 45 119
Rainfall, depth of water in circular section basin after rain, and height, and diameters at different heights, the diameter being trebled for every inch in height, given; what was rainfall? No. 48 147
Solid, find surface, volume, and center of gravity of each, where it has a square for its base and all parallel sections squares, and two sections through middle points of opposite sides of the square semi-circles. No. 54 314–317
Target, where a, in line of two lights of given intensities, must be set up to receive maximum illumination. No. 52 253
"The Thistle of Scotland" curve, find equation and determine asymptotes. No. 44 21–22
Vault, find convex surface and volume of, whose floor forms a square, and all parallel sections squares, the two vertical sections through middle points of opposite sides being equal semi-circles. No. 47 146
Volume of tetrahedron whose edges are lines joining points A, B, C, D in space, D remaining fixed and A, B, C moving, and co-ordinates of points given, required times when, will be a certain number of cubic inches. No. 46 121

MECHANICS.

Balloon, required volume of hydrogen to be put into balloon so as to be on point of ascending with man. No. 35 243
Box, time to empty rectangular, if vertical slit is made in middle of side. No. 36 279
Motion, to determine, of perfectly elastic but rough mass M and radius R, let fall, while rotating, on horizontal plane. No. 31 148
Person standing in swing, rises at lowest point and crouches at highest. No. 39 319–320
Prolate spheroid of revolution, fixed at focus is given a blow at extremity of minor axis, etc. No. 38 317–318
Resultant attraction, if particle is placed within thin cylindrical shell without ends. No. 34 217
Sphere and board, if board is balanced but inclined and sphere liberated above point of suspension, to find motion of the system. No. 37 280
Stalk, at what angle wedge-shaped blade struck to sever, with least force. No. 33 186
Wind pump, to find pressure along the axis of wheel. No. 32 ..... 185, 242

DIOPHANTINE ANALYSIS.

Decompose into sums of two squares $13^2 . 61^3$. No. 35 80
Demonstrate that $x^3 + (2x-3)^3 + (nx-3n)^3 = n^3 x^3$, when n is any number, and $n^3 + 1 = x$. No. 38 151
Equation $x^3 + y^2 = a^2$, solved. No. 45 282
Equation, what is the, when sum of three positive integral cubic roots of, is a square. No. 40 187
Find first four integral values of n in $n(5n-3) \div 2 =$ a square. No. 37 151
Find first six integral values of n in $n(n+1) \div 2 =$ a square. No. 36 81
General solution, finding values of a and b to make x and y integral in $x^2 + x\sqrt{xy} = a$ and $y^2 + y\sqrt{xy} = b$. No. 46 283
Least integral values of a, b, c, d, to find in given equation. No. 41 188
Note on solutions of problem 27 83
Number, what is the, when the m^{th} root of the n^{th} power of an integral number is a perfect p^{th} power. No. 39 152

Parallelograms, required all, whose sides a, b and diagonals c, d are rational. No. 42 ..... 83, 219, 320–322
Prove that $[n(n+1)(2n+1)]\div 6$ is a whole number for all valves of n; and $[n(n-1)(n+1)]\div 24$ when n is odd. No. 34 80
Series of integral numbers, find, in which sum of any two consecutive terms is the square of their difference. No. 43 221
Triangle, hypotenuse of right triangle extended at both extremities and lines drawn from right angle to extremities, to find integral values for all lines. No. 44 221

AVERAGE AND PROBABILITY.

Average area of all right triangles having constant hypotenuse. No. 26.56–60, 223, 256
Arrows sticking in target, show chance, etc. No. 38 324
Earth from sun, average distance, neglecting perturbations. No. 29 ..... 154, 257
Mean area of dodecagonal surface formed by joining random points, one in each sectoral triangle of regular inscribed dodecagon. No. 27 84
Notes on problem 26 ..... 58–60, 223, 256
Note on problem 33 323
Ordinates, find chance that, of two points taken at random in circumference of a semi-circle, fall on either side of a point taken at random on the diameter. No. 34 259
Random sector, to find average area of, whose vertex is a random point in a given circle. No. 32 258
Rectangle, to find average length of a line drawn across opposite sides. No. 31 191
Regular polygons, average area of all, having a constant apothem. No. 33 258
Square, find chance that distance of two points within a, shall not exceed a side. No. 35 285
Triangles, average area of all, having a given base and vertical angle. No. 28 153
Triangles, average area of all, inscribed in a given circle. No. 30 190
Triangles, average area of all, having two sides a and b. No. 37 323–324

MISCELLANEOUS.

Center of gravity of plane surface, when sum of distances of that point from all other points is a minimum. No. 30 86
Chord, length of, cutting off 1-5 of area of given circle. No. 36 193
Field, area when distances from point without square, to corners A, B, C, are given. No. 33 155
Fomalhout and Antares, sidereal time to observer in given latitude when they have same altitude. No. 35 ..... 192, 224–225
Note on solution IV, page 190, Vol. II 90
Note on problem 4 91
Parallelogram, volume of solid generated by variable, required. No. 34 326–327
Pendulum, length of, when clock gains so much, and length to keep true time. No. 39 290
Stalk, at what inclination, vertical cylindric, struck to sever by least blow. No. 31 88
Storm, how far off when edge of storm-cloud is just visible above horizon, if cloud is one mile above earth. No. 32 88
Sun, at what angle with horizon will rise in given latitude. No. 38 288
Tract of land, determine from data of problem, dimensions and area of rectangular, and of largest square field inscribed in the two right triangles formed by its diagonal. No. 37 225
Sidereal time to observer in given latitude, when Fomalhout and Antares have same altitude. No. 35 ..... 192, 224, 327